AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions of claims in the application:

Listing of Claims:

Claims 1.-10. (Cancelled)

11. (New) A system, comprising:

a primary Parabolic Total Reflection Reflector (PTRR) that collects incident sunlight and reflects a wide beam of rays, the primary PTRR comprising at least one Corrected Rectangular Prism (CRP) that enables correct focusing;

a secondary Ellipsoidal Total Reflection Reflector (ETRR) that receives at least a portion of the wide beam of rays and focuses the wide beam of rays into a narrow beam of rays, the secondary ETRR comprising at least one CRP that enables correct focusing;

one or more solar arteries that receive at least a portion of the narrow beam of rays and guide at least the portion of the narrow beam of rays under total reflection, the one or more solar arteries comprising at least one Corrected Rectangular Prism (CRP) that minimizes radiation propagation losses;

one or more elements accessory to the one or more solar arteries, the one or more elements guide sunlight in at least the portion of the narrow beam of rays that is received by the one or more solar arteries, wherein the one or more elements comprise at least one CRP that minimizes sunlight propagation losses; and

reflectors formed from CRPs, which define a solar radiation beam path for reflecting or propagating solar radiation to an intended destination and defined by a curvature of the system having a focal center of curvature (E) for focusing the solar radiation beam, wherein the reflectors comprise (i) a front surface, which is oriented towards the solar radiation beam path and is smoothly curved in correspondence with the curvature of the solar system, and (ii) a rear surface comprising essentially rectangular prisms with tops of the essentially rectangular prisms enveloped by a curvature parallel to that of the front surface, further wherein

in cross-section of an essentially rectangular prism in a plane at least locally perpendicular to the longitudinal tangent of the essentially rectangular prism's top acme:

separate sides of the essentially rectangular prisms are curved for a corrected accurate focusing, and

in the section of the front surface, for each essentially rectangular prism, a mid point is defined as a perpendicular projection of a top acme point of the essentially rectangular prism onto the section of the front surface, and an intersection point is defined as a perpendicular projection of a selected point on a curved side of the essentially rectangular prism onto the front surface intersection curve, and wherein a tangent in each point along the curved sides has an orientation angle relative to the orientation of the sides at the top acme point corresponding with and dependent on a predetermined angle formed between intersecting tangents at an intersection point and the mid point.

12. (New) The system of claim 11, wherein the primary PTRR comprises one or more Tiles of Total Reflection (TTR) based on an appropriate parabolic substrate, wherein at least one tile that is part of the one or more TTR comprises:

a first surface of smooth parabolic form; and

a second surface of parabolic form and bas-relief that comprises the at least one CRP, wherein a top acme of the at least one CRP converges to a top of the primary PTRR and at least one cross-section of at least one side of the at least one CRP is at least one curved line that enables correct accurate focusing.

13. (New) The system of claim 11, wherein the orientation angle ($\varphi 2$) and the predetermined angle ($\varphi 1$) obey the following relationship: $(\varphi 1 / 4n) \leq \varphi 2 \leq \varphi 1 / 2)$, where n is an index of refraction of the material of the essentially rectangular prism in the relationship.

14. (New) The system of claim 12, wherein the at least one tile that is part of the one or more TTR has a first dimension of substantially 20 cm and a second dimension of substantially 20 cm, the material of the at least one tile is one of transparent glass without iron oxide or transparent plastic.

15. (New) The system of claim 12, wherein the primary PTRR is based on at least one of a metal support frame affixed on a first mechanism of rotation about the first rotation axis, the first mechanism is based on a second mechanism of rotation about the second axis, wherein the first mechanism of rotation and the second mechanism of rotation are attached to a support base via at least in part two or more bearings.

16. (New) The system of claim 15, wherein the secondary ETRR comprises one or more TTR and is based on a metal support frame that is attached to the support base, a material of the secondary ETRR is the same as a material of the primary PTRR, wherein one or more tiles in the one or more TTR in the secondary ETRR comprise:

a first surface of one of a smooth parabolic form or an ellipsoidal form, wherein the form of the first surface is dictated at least in part by the position of a focal point of the secondary ETRR relative to the position of a focal point of the primary PTRR; and

a second surface of one of parabolic form or ellipsoidal and bas-relied form, wherein the second surface comprises the at least one CRP, wherein a top acme of the at least one CRP converges to a top of the secondary ETRR and at least one cross-section of at least one side of the at least one CRP is at least one curved line that enables focusing.

17. (New) The system of claim 16, wherein, to reflect the wide beam of rays as a narrow beam of rays, the secondary ETRR is located in a position behind a focal point of the primary PTRR, wherein the position determines a degree of concentration and a dispersion angle of the narrow beam of rays.

18. (New) The system of claim 11, further comprising one or more reflection media located in front of a focal point of the secondary ETRR at a predetermined angle with respect to the narrow beam of rays, wherein at least one reflecting medium in the one or more reflecting media reflects the narrow beam of rays into at least one solar artery in the one or more solar arteries.

19. (New) The system of claim 18, wherein at least one reflecting medium in the one or more reflection media is removed to allow the narrow beam of rays to focus on a spectrally selective black absorbent surface, which is located nearly at the focal point of the secondary ETRR and transfers heat from the narrow beam of rays focused on the spectrally selective black absorbent surface to a fluid, wherein the fluid is utilized as a heating source or to produce cooling energy for air-conditioning through an adsorption heat pump.

20. (New) The system of claim 11, wherein at least one element of the one or more elements accessory to the one or more solar arteries connects the one or more solar arteries to a main solar artery that guides at least part of the at least a portion of the narrow beam of rays to one or more disparate elements accessory to the one or more solar arteries for sunlight illumination within a building via one or more disparate solar arteries.

21. (New) The system of claim 19, wherein the at least one reflecting medium is a cold reflector that reflects nearly all light substantially within the visible part of an electromagnetic (EM) radiation spectrum and transmits nearly all light within at least a portion of the infrared (IR) part of the EM radiation spectrum, the light within at least a portion of the IR part of the EM radiation spectrum is focused directly onto the spectrally selective black absorbent surface, wherein the cold reflector is oriented at a predetermined angle towards the path of the narrow beam of rays to divert the narrow beam of rays by about 90 degrees towards the at least one solar artery that of the one or more solar arteries, for a diversion angle of about 90 degrees, the predetermined angle is substantially 45 degrees.

22. (New) The system of 21, further comprising an auxiliary focusing reflector that focuses the narrow beam of rays onto photovoltaic cells to produce at least one of electrical energy or thermal energy.

23. (New) The system of 22, wherein the photovoltaic cells are deposited at the position of, and in replacement of, the spectrally selective black absorbent surface and behind the cold reflector or in absence thereof.

24. (New) A system, comprising:

a primary Parabolic Total Reflection Reflector (PTRR) that collects incident sunlight and reflects a wide beam of rays, wherein the primary PTRR comprises one or more Tiles of Total Reflection (TTR) based on an appropriate parabolic substrate, wherein at least one tile that is part of the one or more TTR comprises:

a first surface of smooth parabolic form; and

a second surface of parabolic form and bas-relief that comprises at least one Corrected Rectangular Prism (CRP), wherein a top acme of the at least one CRP converges to a top of the primary PTRR and at least one cross-section of at least one side of the at least one CRP is at least one curved line that enables correct focusing; and

wherein the material of the at least one tile is one of transparent glass without iron oxide or transparent plastic; and

an auxiliary focusing reflector that focuses the wide beam of rays onto photovoltaic cells to produce at least one of electrical energy or thermal energy, wherein the thermal energy is produced through at least one of cooling of at least one of the photovoltaic cells or utilization of thermal energy for cooling through an adsorption heat pump.

25. (New) The system of 24, wherein the at least one CRP comprises:

an internal curved surface, wherein the internal curved surface is one of a paraboloidal surface or an ellipsoidal surface; and

an external bas-relief surface with at least two side surfaces that are curved, curvature of one or more of the two side surfaces is based on curvature of the internal curved surface.

26. (New) The system of claim 25, wherein, in the at least one solar artery, the at least one Corrected Rectangular Prism (CRP) that minimizes radiation propagation losses has an internal surface curvature that is at least one of:

proportional to a ratio of an opening angle of the narrow beam of rays and the index of refraction of the material of the at least one solar artery; or

lower bounded by an angle that is proportional to the ratio of the opening angle of the narrow beam of rays and the index of refraction of the material of the at least one solar artery, and upper bounded by half the opening angle.

27. (New) The system of claim 26, wherein at least one solar artery of the one or more solar arteries is constructed from a thin, hollow pipe of transparent material, wherein a center of an opening of the pipe lies on a cylindrical axis of the pipe, the at least one solar artery includes:

a thin cylindrical wall;

a smooth internal surface;

a bas-relief external surface with at least a Corrected Rectangular Prism; and

an external protective layer;

28. (New) The system of claim 27, the one or more elements accessory to the one or more solar arteries comprise a corner element that enables change in direction of incident propagated sunlight, wherein the corner element includes one of a reflector or a prism, wherein, if the reflector is included, the reflector is one of a conventional reflector or a total reflection reflector (TTR), the reflector is a TTR if an aperture angle of the incident propagated sunlight is within a predetermined range.

29. (New) A method, comprising:

collecting incident sunlight by a primary Parabolic Total Reflection Reflector (PTRR) and reflecting a wide beam of rays, the primary PTRR comprising at least one Corrected Rectangular Prism (CRP) for correct focusing of the wide beam of rays;

receiving at least a portion of the wide beam of rays at a secondary Ellipsoidal Total Reflection Reflector (ETRR), the ETRR reflecting the wide beam of rays as a narrow beam of rays the secondary ETRR comprising at least one CRP for correct focusing;

receiving at least a portion of the narrow beam of rays at one or more solar arteries, the one or more solar arteries guiding at least the portion of the narrow beam of rays under total reflection, the one or more solar arteries comprising at least one Corrected Rectangular Prism (CRP) for minimizing radiation propagation losses; and

guiding sunlight in at least the portion of the narrow beam of rays received by the one or more solar arteries via one or more elements accessory to the one or more solar arteries, the one or more elements comprising at least one CRP for minimizing sunlight propagation losses.

30. (New) The method of claim 29, further comprising:

focusing directly at least a portion of the wide beam of rays on at least one photovoltaic (PV) cell or receiving at least a portion of the wide beam of rays at a secondary Ellipsoidal Total Reflection Reflector (ETRR), a ETRR reflecting the wide beam of rays as a narrow beam of rays, wherein a secondary ETRR comprises at least one Corrected Rectangular Prism (CRP) that enables correct focusing and focusing on at least one photovoltaic cell; and

receiving at least a portion of the narrow beam of rays at one or more PV cells, the one or more PV cells producing electricity and hot water from cooling of at least one PV cell of the one or more PV cells, the hot water from the cooling of at least one photovoltaic cell producing at least thermal energy or utilizing thermal energy for cooling through an adsorption heat pump.